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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/836,286	04/18/2001	Hidetaka Nambu	Q62963	5457

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SUGHRUE, MION, ZINN,  
MACPEAK & SEAS  
2100 Pennsylvania Avenue, N.W.  
Washington, DC 20037

EXAMINER

DEO, DUY VU NGUYEN

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 01/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/836,286

Applicant(s)

NAMBU, HIDETAKA



Examiner

DuyVu n Deo

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 07 October 2003.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 4-6, 13-15, 17, 19, 21 and 22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 4-6, 13-15, 17, 19, 21, 22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. §§ 119 and 120**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All   b) ☐ Some \*   c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)                      4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)                      5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_                      6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Election/Restrictions*

1. Applicant's election without traverse of claims 1-19 in Paper No. 7 is acknowledged.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 4-6, 13-15, 21, 22 are rejected under 35 U.S.C. 102(e) as being anticipated by Ye et al. (US 6,080,529).

Ye describes a method for etching organic low dielectric constant (or low k) layer such as FLARE (polyarylene ether), and SILK using a gas comprising NH<sub>3</sub> (col. 9, lines 1-3, lines 33-46; col. 12, lines 18-32; col. 19, line 51-62; col. 22, line 40-42). Ye further describes steps: forming organic low k film on a substrate, forming a silicon dioxide (claimed silicon-containing insulating film or SiO<sub>2</sub>) on the low k film (col. 11, line 44-50; col. 21, line 44-45, 50-54; col. 22, line 22-25); removing a part of the silicon oxide to form a first opening (col. 11, line 57-60; col. 22, line 1, 26, 27; figures 2B, 4B); etching the organic low k film with the first opening as a first mask using a gas comprising NH<sub>3</sub> (col. 12, lines 18-32; col. 19, line 51-62; col. 22, line 40-42).

Referring to claim 13, Ye also teaches that when the above method is done to form contact hole or via in a damascene process, the method would further comprise forming a diffusion barrier to line the openings (claimed a first barrier metal on an entire inside surface of

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the hole); and forming a first conductive layer such as copper, tungsten, or aluminum on the barrier to fill the opening (col. 20, line 1-20).

Referring to claims 21, and 22 the etching gas additionally comprises a combination of N<sub>2</sub>, H<sub>2</sub>.

Referring to claims 5, 14 the organic low k film such as FLARE (polyarylene ether) and SILK would read on claimed hydrocarbon-based organic low k film.

Referring to claims 6, 15 the method further comprising a photoresist on the silicon dioxide; removing a part of the photoresist to form a second opening which is used as a second mask for the step of etching the silicon dioxide film (col. 11, line 52-col. 12, line 3; col. 22, line 26-28); wherein the photoresist is removed during the step of etching the organic low k film (col. 11, line 61-65; col. 12, line 38-40; line 49-53).

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 17, 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ye as applied to claim 16 above, and further in view of Chiang et al. (US 5,817,572).

Referring to claims 17, 19, the steps and limitations of these claims are the same as that of claims 11, 12 except that these steps are used to form another or upper interconnect level. Even though Ye is silent about forming an additional or upper interconnect level; however, it is well known to one skilled in the art that a semiconductor device has many structures or levels of

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interconnections. Chiang is used here to show that at least 2 levels of interconnections are formed within a semiconductor device (col. 5, line 40-61; figure 9). Chiang also describes that the additional interconnect level or upper level may be formed in a similar manner as that of the lower interconnect level (col. 5, line 58, 59). Therefore, it would have been obvious for one skilled in the art at the time of the invention in light of Chiang to repeat these steps in order to form another or upper level of interconnection for a semiconductor device with a reasonable expectation of success.

### ***Response to Arguments***

6. Applicant's arguments with respect to claims 4-6, 13-15, 17, 19, 21, 22 have been considered but are moot in view of the new ground(s) of rejection.

For the clarification, paragraph 3 in the previous rejection should have been "Claims 1-16 are..." However, all the claims were addressed, including claims 4 and 13 (please see previous action: page 2, under paragraph 3, line 7, where it says "...substrate, forming a silicon dioxide (claimed silicon-containing insulating film or SiO<sub>2</sub>)).

Applicant's arguments fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references.

Applicant's arguments do not comply with 37 CFR 1.111(c) because they do not clearly point out the patentable novelty which he or she thinks the claims present in view of the state of the art disclosed by the references cited or the objections made. Further, they do not show how the amendments avoid such references or objections.

*Conclusion*

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to DuyVu n Deo whose telephone number is 703-305-0515.

DVD  
December 23, 2003



ROBERT KUNEMUND  
PRIMARY EXAMINER